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Replacing GB/T 3960-1983

Plastics - Test method for friction and wear by sliding

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Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard replaces GB/T 3960-1983 *Plastics - Test method for friction and wear by sliding*. Compared with GB/T 3960-1983, the main modifications in contents are as follows:

- added a statement of standardized object (see Clause 1 of this Edition);
- added normative references (see Clause 2 of this Edition);
- modified the terms and definitions involved in this Standard (see 3.1, 3.2, 3.4, 3.7 and 3.9 of this Edition; 1.1, 1.2, 1.3, 1.4 and 1.5 of Edition 1983);
- added the terms and definitions involved in this Standard (see 3.3, 3.5, 3.6, 3.8, 3.10 and 3.11 of this Edition);
- added the principle of test method (see Clause 4 of this Edition);
- modified some requirements and formats of test equipment used in this Standard (see 5.1 of this Edition; 3.1, 3.2, 3.3, 3.4 and 3.5 of Edition 1983);
- modified the requirements for test ring (see 6.1 of this Edition; 3.6 of Edition 1983);
- modified requirements for specimen (see 6.2 of this Edition; 2.1 and 2.2 of Edition 1983);
- added conditions for friction and wear test (see 7.2 of this Edition);
- modified test steps (see 8.1 and 8.2 of this Edition; 6.1 and 6.2 of Edition 1983);
- added the characterization means of the amount of wear (see 9.2 of this Edition);
- modified the requirements for effective number (see 9.5 of this Edition; 7.1.2 of Edition 1983);
- added the requirements for test report [see 10 a), b), e), g) and h) of this Edition].

This Standard was proposed by China Petroleum and Chemical Industry Federation.

Plastics - Test method for friction and wear by sliding

1 Scope

This Standard specifies the sliding friction and wear properties of plastics and their composites.

This Standard is applicable to the determination of sliding friction and wear properties of plastics and their composites.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 2918, *Plastics--Standard atmospheres for conditioning and testing* (ISO 291, IDT)

GB/T 1033.1-2008, *Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method liquid pyknometer method and titration method* (ISO 1183-1:2004, IDT)

GB/T 17754-2012, *Tribology terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 17754-2012 and the followings apply. For easy use, some of the terms and definitions in GB/T 17754-2012 are still listed as below.

3.1 sliding friction

friction between the two objects when they are sliding

3.2 friction

a phenomenon and process that hinders the movement and accompanied by mechanical energy loss when there is a tangential relative motion or a movement tendency that occurs between the contact surfaces of the objects under the action of force

a phenomenon and process of surface deformation, damage or surface material gradual lost

[GB/T 17754-2012, 2.3]

3.8 wear loss

in the process of wear, material contact surface deformation of rubbing pair or amount of surface material lost

NOTE 1 It can usually be represented in volume, mass, geometric scale, etc.

[GB/T 17754-2012, 5.1]

NOTE 2 This standard uses volume wear, mass wear, scar width to represent.

3.9 friction coefficient

μ

ratio of the frictional force to the normal force between a pair of rubbing pair

[GB/T 17754-2012, 4.18]

3.10 methods of lubrication

a method to supply lubricate media for surface of rubbing pair

NOTE It can be divided into gap lubrication, continuous lubrication, one-way lubrication, circulation lubrication, etc.

[GB/T 17754-2012, 6.47]

3.11 lubricant

a material that is easy to shear and added to two relatively moving surfaces, used to reduce friction and control the wear

[GB/T 17754-2012, 6.48]

4 Principle

Install the specimen on the test machine. Install the specimen above the test ring. Apply the load. The specimen shall remain still. The test ring shall rotate at a certain speed. See Figure 2.

6 Test ring and specimen

6.1 Test ring

Test ring material is generally 45# steel. It requires quenching, heat treatment HRC40 ~ 45. Its dimensions: outer diameter is (40 ± 0.5) mm; the inner diameter is 16 mm; the width is 10 mm. Outer circle requires chamfering. Chamfer shall be all at $0.5 \times 45^\circ$. The coaxial deviation between the outer surface and the inner circle is less than 0.01 mm. The outer surface roughness R_a is not more than 0.4. Test the outer surface roughness of the test ring before each test and record it so as to ensure that the outer surface roughness R_a shall be not more than 0.4. The test ring shall remove the oil. Store the test ring in a dry cylinder to prevent rust.

NOTE Ring material can be set according to need.

6.2 Specimen

6.2.1 Appearance and size

The specimen is rectangular. It requires surface smoothness, no bubbles, cracks, delamination, significant impurities and processing damage or other defects.

Specific size and requirements: $(30^{+0.5}_{-0.1} \times 7^{+0.1}_{-0.2} \times 6 \pm 0.5)$ mm; parallelism of specimen's upper and lower surface shall not be less than 0.02 mm.

6.2.2 Quantity

Not less than 3 specimens per group.

6.2.3 State adjustment

Except as otherwise provided in the test standard, the specimen shall be adjusted for more than 16 hours at room temperature of $(23 \pm 5)^\circ\text{C}$ and relative humidity of $(50 \pm 5)\%$ according to GB/T 2918 or conditions agreed by parties concerned.

7 Test conditions

7.1 During the test, the specimen shall remain still. The test ring shall rotate at 200 r/min. The test time shall be 2h. The load shall be 196 N. According to material, other loads are allowed to choose.

7.2 The test can be carried out under no lubrication conditions (dry friction)

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